Technology Deployment Initiatives and Partnership Program
Request for Funding ~ FY 2005

FHWA Strategic Goal Area(s): Safety, Mobility

Focus Technology: High Performance Materials

Project Title: Crash Test Evaluation for 2-Tube Curb Mount Bridge Rail

Problem Statement: Research has developed railings to withstand impact loads from vehicles of ever-increasing size. However, aesthetic considerations have been overshadowed by safety and structural requirements. FLH bridge engineers and National Park Service architects are focused on constructing crashworthy bridge appurtenances that are aesthetically compatible with the local environment and that match or simulate bridge rail that has historically been used in the region.

The 2-Tube Curb Mount Bridge Rail is a steel post and beam rail that has been designed to be aesthetically pleasing as well as structurally sound, and has been used on several bridge projects in the last decade within Yellowstone National Park. However, this bridge rail has not been tested and evaluated to the guidelines specified in National Cooperative Highway Research Program (NCHRP) Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features*.

Proposal: **Phase I:** Modify the existing 2-Tube Mount Bridge Rail design by moving the rail to be flush with the face of the curb and the stone masonry parapet. These two major design modifications will address the concerns of vehicular vaulting due to the curb offset and vehicular snagging at the rail to stone masonry transition point. A safety evaluation will be completed to assure the design meets all applicable current standards. Crash test and evaluate the performance of the 2-Tube Curb Mount Bridge Rail in accordance with the guidelines presented in NCHRP Report 350 test 2-11 (a 2000-kg pickup truck).

Phase II: If the 2-Tube Curb Mount Bridge Rail fails to meet the guidelines in NCHRP Report No. 350, the data will be analyzed and the appropriate design modifications will be the responsibility of FLH. A safety evaluation will be completed to assure the design meets all applicable current standards. The tube mount rail will be retested in accordance with the guidelines presented in NCHRP Report 350 test 2-11 (a 2000-kg pickup truck). Future funding will be sought to crash test the masonry to rail transition.

If Phase I is successful there will be no need for a further redesign or testing of the tube rail. Phase II will focus on the tube mount bridge rail to stone masonry transition. The modified design with the approved tube mount railing will be crash tested and the performance of the tube mount bridge rail to stone masonry transition evaluated in accordance with the guidelines presented in NCHRP Report 350 test2-21 of the 2-Tube Curb Mount Bridge Rail.

Benefits: Upon satisfactory crash test results, the design will be included in the Standard Drawings for FLH bridge projects and made available to other transportation agencies throughout the United States.

Resources/Cost:			
	Phase I,	*FY 2005*	$50,000
	Phase II,	*FY 2005*	$50,000
	TOTAL:		**$100,000**

Duration: Two years

Organization/Method: A minimum of two reports will be provided presenting the details of the modified 2-Tube Curb Mount Bridge Rail, the results of the NCHRP Report 350 test 1-11 and the evaluation of the rail's performance according to the guidelines of NCHRP Report 350.

Submitter:

Agency/Division: Western Federal Lands Highway Division
Name: Amit Armstrong, Ph.D., P.E., Technology Deployment Engineer
Phone: 360-619-7668
Date: February 17, 2005

Champion:

Name: Jeff Berg, P.E., Bridge Design Engineer
Phone: 360-619-7719